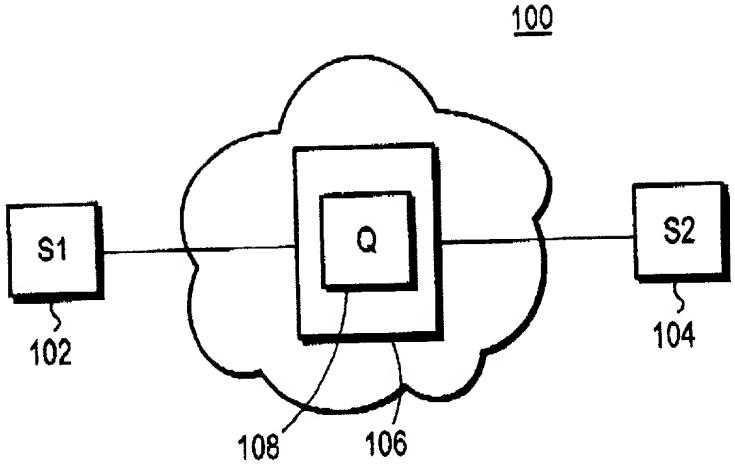


FIG. 1

EP 3 965 454 A1

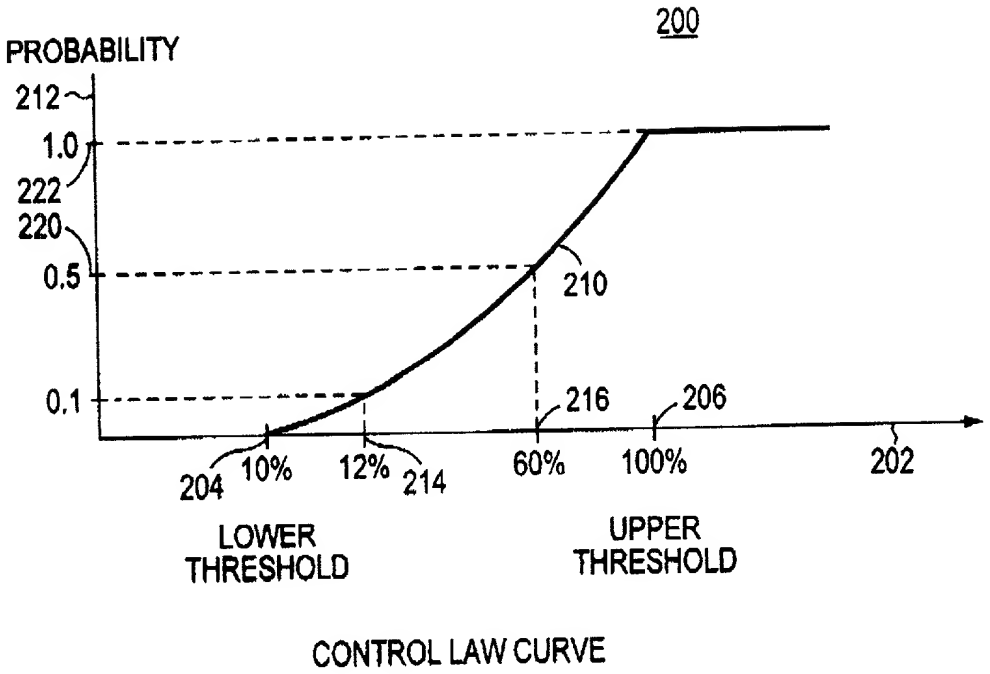

200
PROBABILITY
212
1.0
222
220
0.5
0.1
210
216
206
204
10%
12%
214
60%
100%
202
LOWER THRESHOLD
UPPER THRESHOLD
CONTROL LAW CURVE

FIG. 2

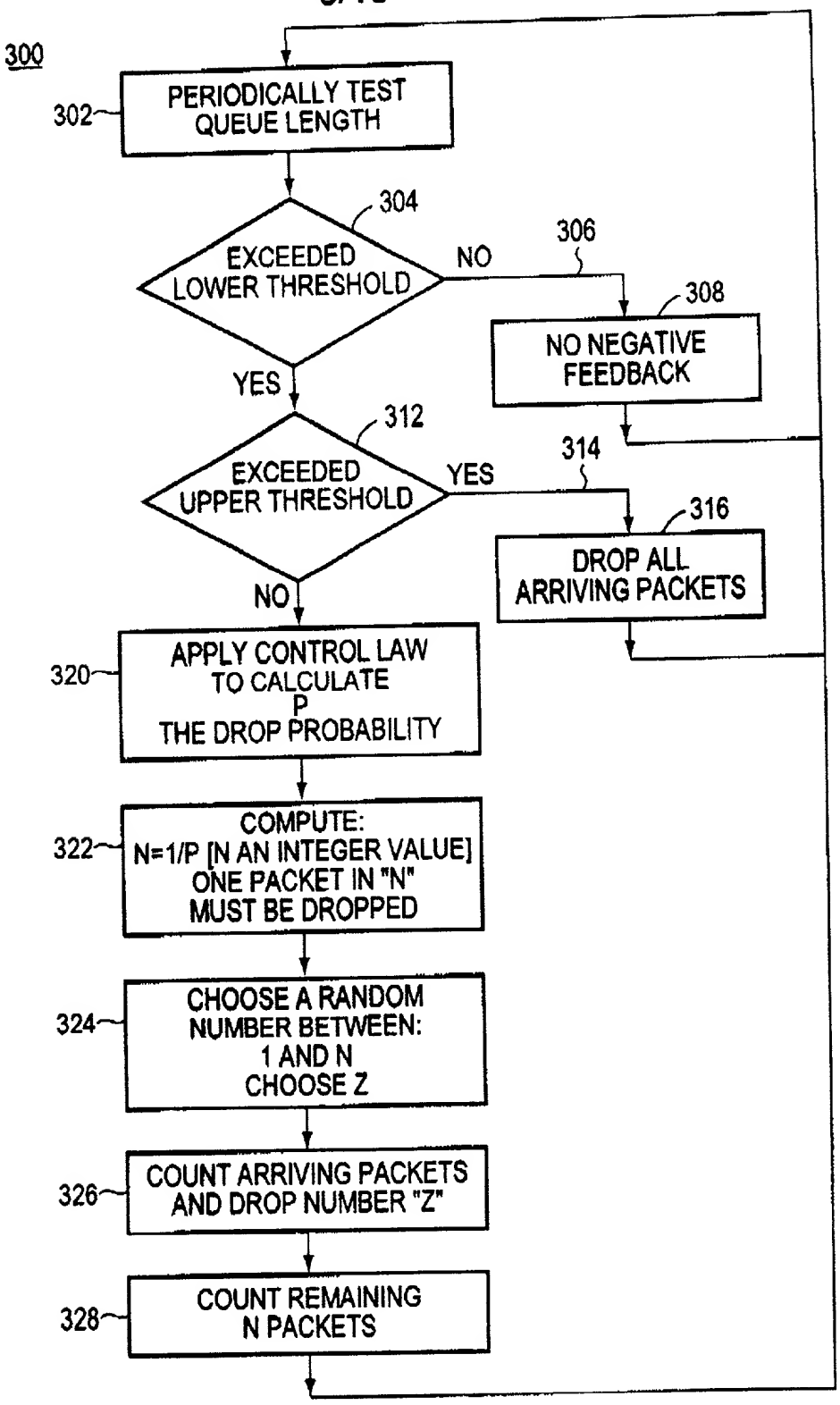

300
PERIODICALLY TEST QUEUE LENGTH
302
304
EXCEEDED LOWER THRESHOLD
NO
306
NO NEGATIVE FEEDBACK
308
YES
312
EXCEEDED UPPER THRESHOLD
YES
314
DROP ALL ARRIVING PACKETS
316
NO
APPLY CONTROL LAW TO CALCULATE P THE DROP PROBABILITY
320
COMPUTE: N=1/P [N AN INTEGER VALUE] ONE PACKET IN "N" MUST BE DROPPED
322
CHOOSE A RANDOM NUMBER BETWEEN: 1 AND N CHOOSE Z
324
COUNT ARRIVING PACKETS AND DROP NUMBER "Z"
326
COUNT REMAINING N PACKETS
328

FIG. 3

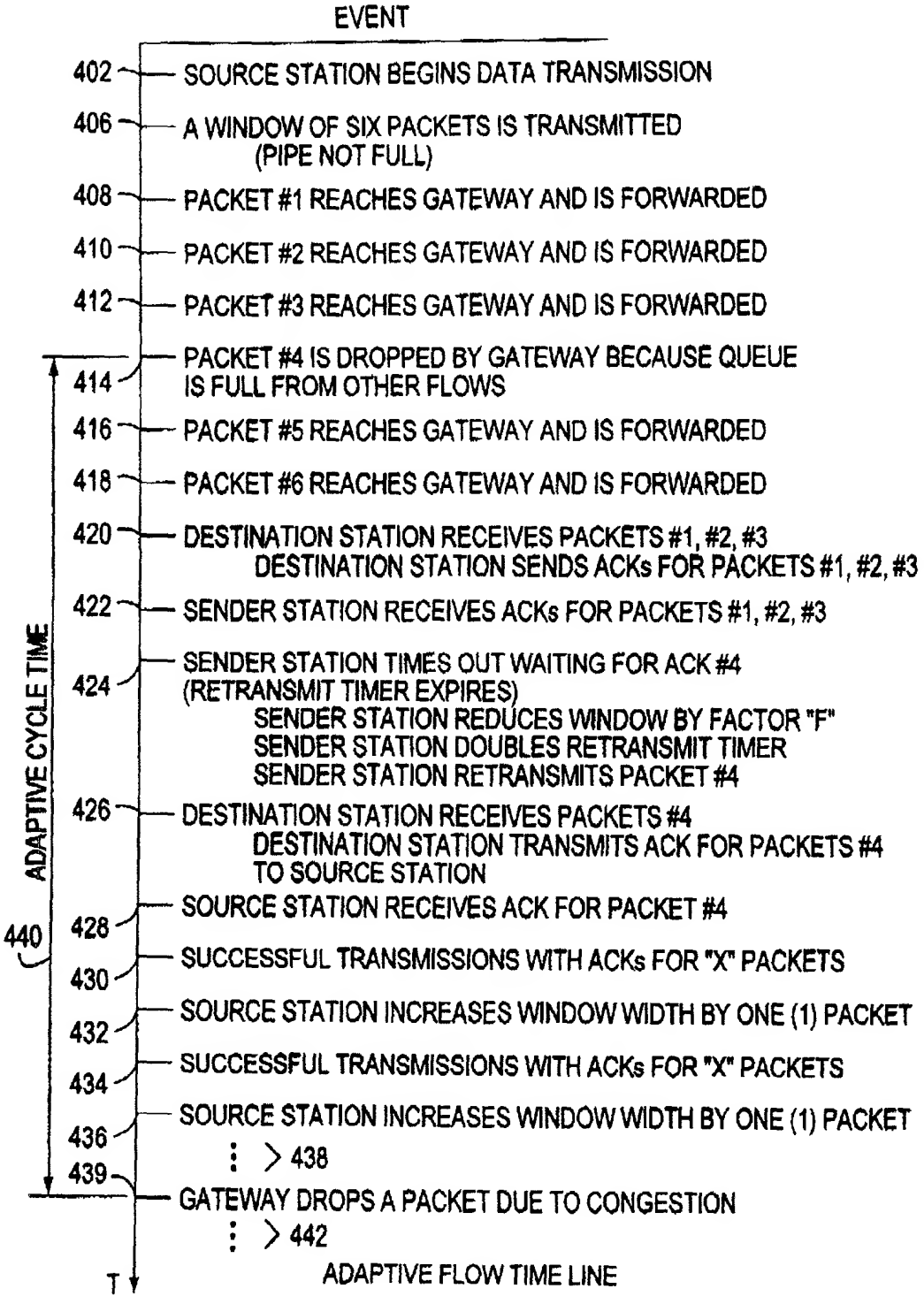

EVENT
402 SOURCE STATION BEGINS DATA TRANSMISSION
406 A WINDOW OF SIX PACKETS IS TRANSMITTED (PIPE NOT FULL)
408 PACKET #1 REACHES GATEWAY AND IS FORWARDED
410 PACKET #2 REACHES GATEWAY AND IS FORWARDED
412 PACKET #3 REACHES GATEWAY AND IS FORWARDED
414 PACKET #4 IS DROPPED BY GATEWAY BECAUSE QUEUE IS FULL FROM OTHER FLOWS
416 PACKET #5 REACHES GATEWAY AND IS FORWARDED
418 PACKET #6 REACHES GATEWAY AND IS FORWARDED
420 DESTINATION STATION RECEIVES PACKETS #1, #2, #3
DESTINATION STATION SENDS ACKs FOR PACKETS #1, #2, #3
422 SENDER STATION RECEIVES ACKs FOR PACKETS #1, #2, #3
424 SENDER STATION TIMES OUT WAITING FOR ACK #4 (RETRANSMIT TIMER EXPIRES)
SENDER STATION REDUCES WINDOW BY FACTOR "F"
SENDER STATION DOUBLES RETRANSMIT TIMER
SENDER STATION RETRANSMITS PACKET #4
426 DESTINATION STATION RECEIVES PACKETS #4
DESTINATION STATION TRANSMITS ACK FOR PACKETS #4 TO SOURCE STATION
428 SOURCE STATION RECEIVES ACK FOR PACKET #4
440
ADAPTIVE CYCLE TIME
430 SUCCESSFUL TRANSMISSIONS WITH ACKs FOR "X" PACKETS
432 SOURCE STATION INCREASES WINDOW WIDTH BY ONE (1) PACKET
434 SUCCESSFUL TRANSMISSIONS WITH ACKs FOR "X" PACKETS
436 SOURCE STATION INCREASES WINDOW WIDTH BY ONE (1) PACKET
> 438
439 GATEWAY DROPS A PACKET DUE TO CONGESTION
> 442
ADAPTIVE FLOW TIME LINE
T

FIG. 4

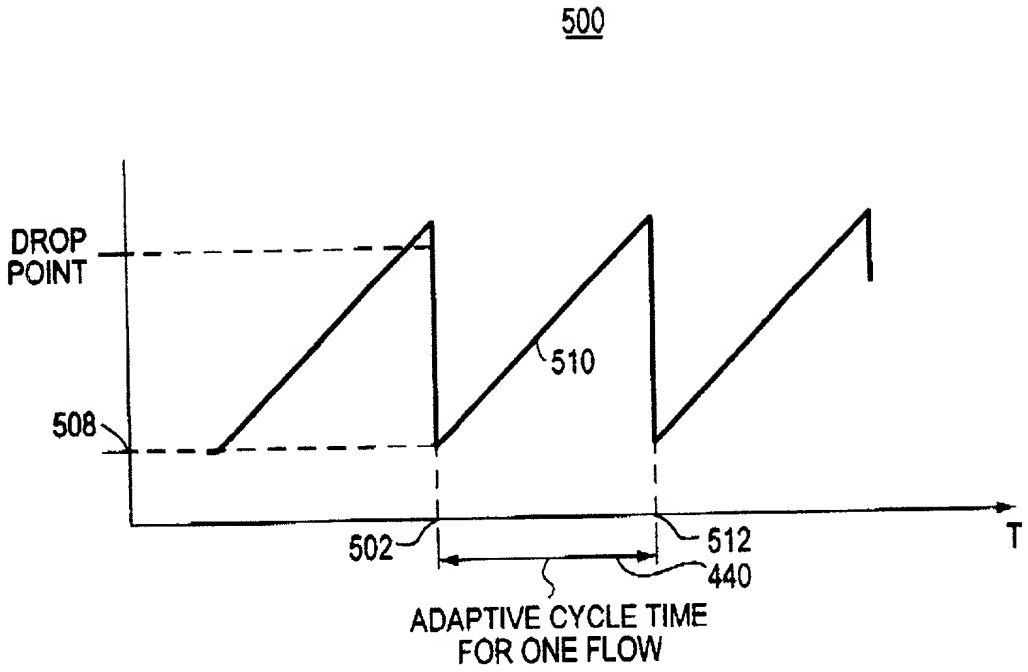


FIG. 5

SUBSTITUTE SHEET (RULE 26)

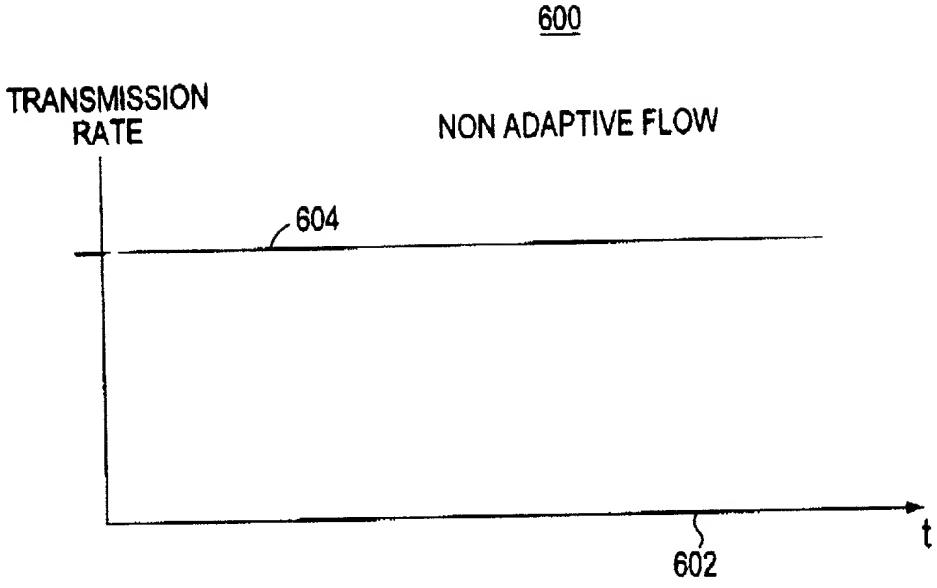


FIG. 6

TOSZTO"thS69Z60

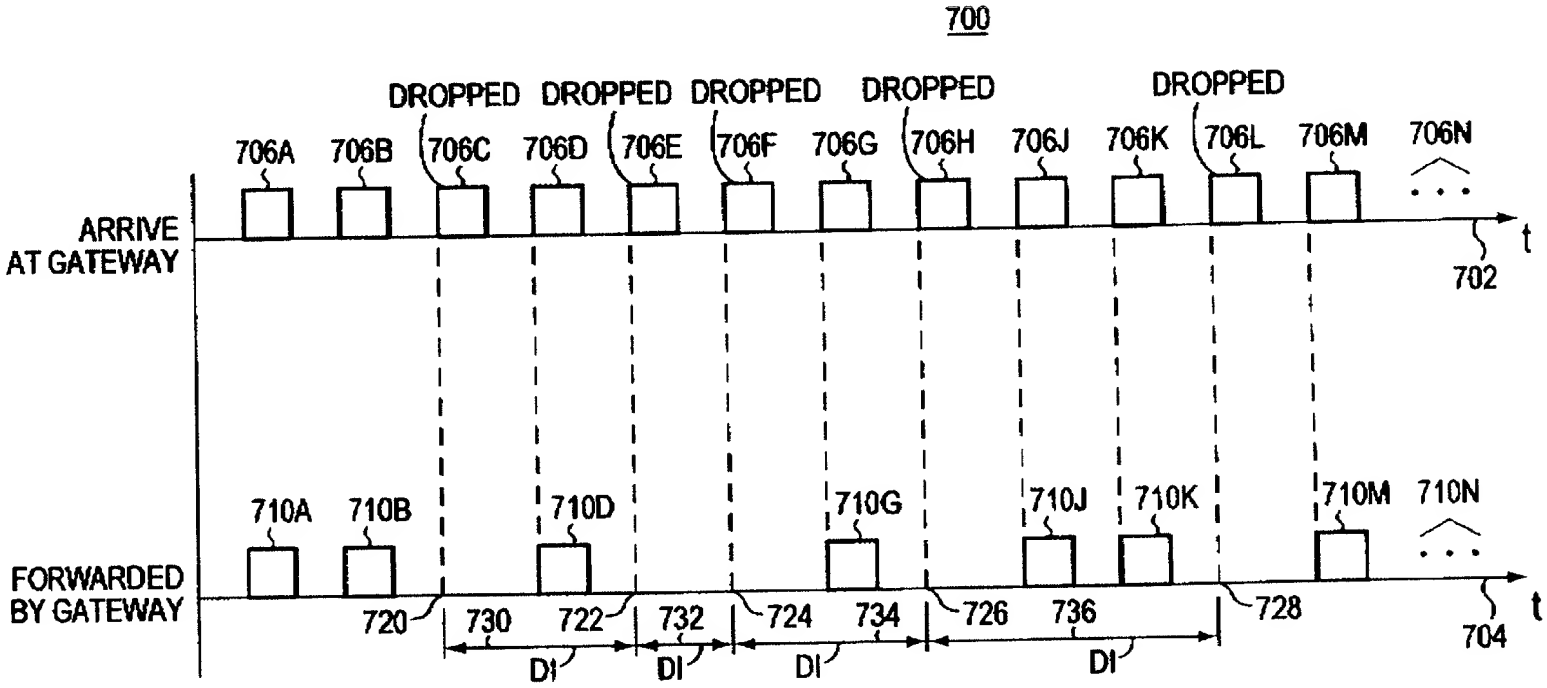


FIG. 7

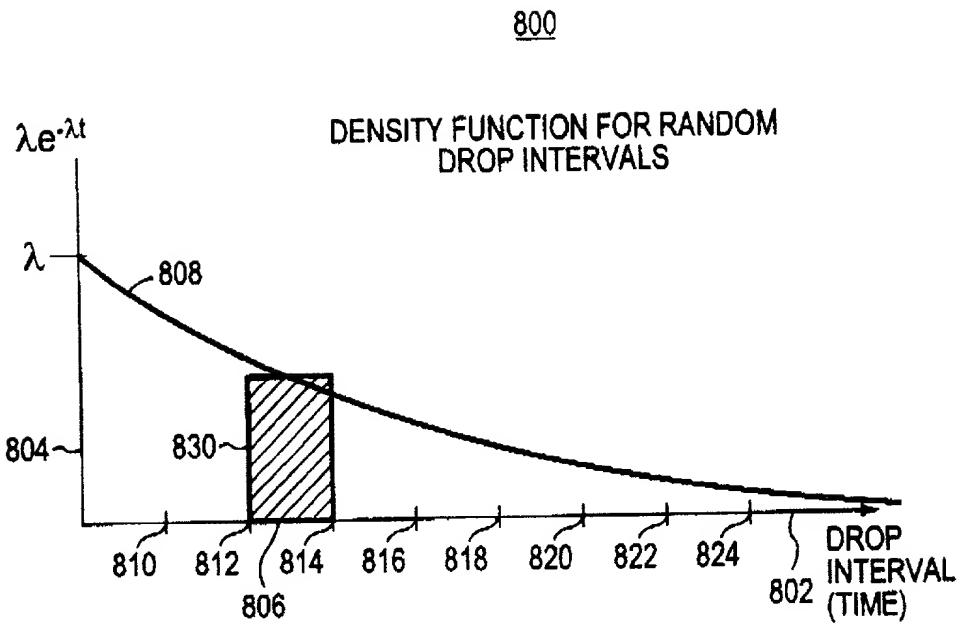

800
DENSITY FUNCTION FOR RANDOM DROP INTERVALS
λe-λt
λ
808
804
830
810
812
814
806
816
818
820
822
824
802
DROP INTERVAL (TIME)

FIG. 8

900

STATE MAINTAINED FOR DROPPED PACKETS

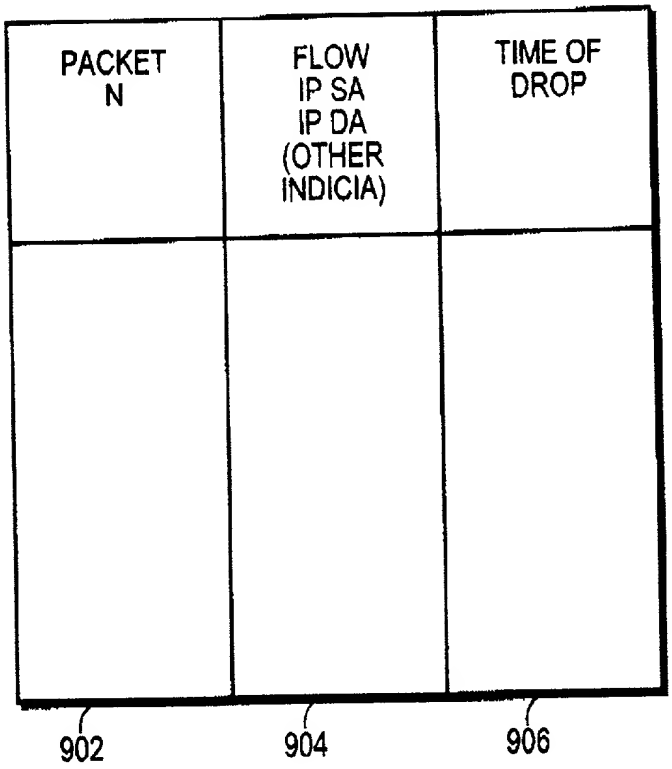


FIG. 9

10,000

FLOW ANALYSIS FOR DROPPED PACKETS

FOR EACH FLOW

PACKET N	TIME OF DROP T	DROP INTERVAL = T(THIS) - T(LAST)

10,002 10,004 10,006

FIG. 10

DOCKET NO. 200207

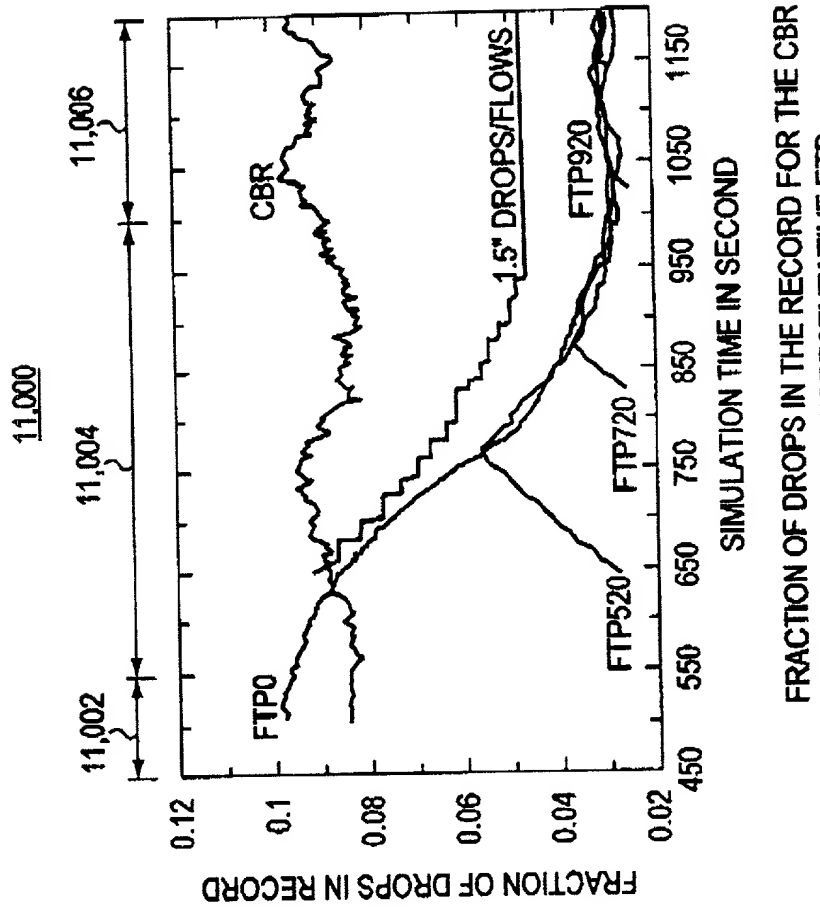
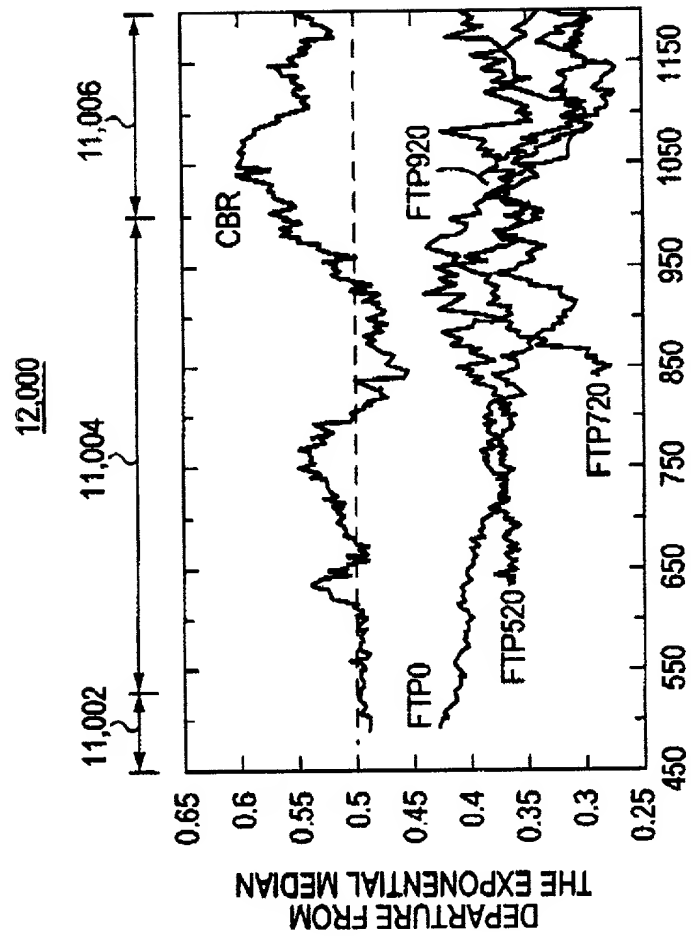

11,000
11,002
11,004
11,006
CBR
FTP0
1.5" DROPS/FLOWS
FTP920
FTP720
FTP520
0.12
0.1
0.08
0.06
0.04
0.02
450
550
650
750
850
950
1050
1150
FRACTION OF DROPS IN RECORD
SIMULATION TIME IN SECOND
FRACTION OF DROPS IN THE RECORD FOR THE CBR AND FOUR REPRESENTATIVE FTPs

FIG. 11



NORMALIZED DEPARTURE FROM EXPONENTIAL MEDIAN OF CBR AND FOUR REPRESENTATIVE FTPs

FIG. 12

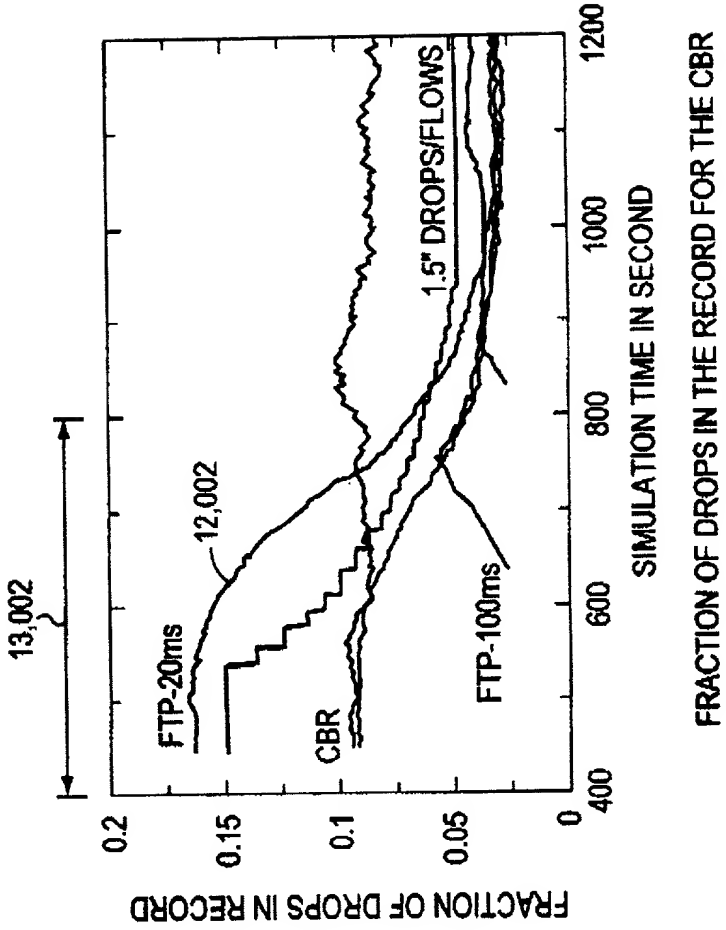
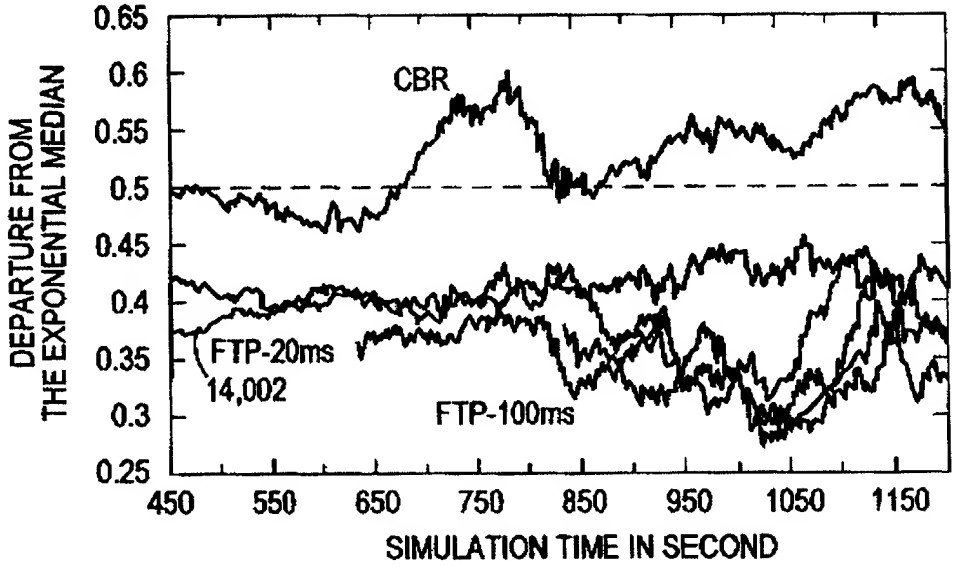

13,000
13,002
12,002
FTP-20ms
CBR
1.5" DROPS/FLOWS
FTP-100ms
0.2
0.15
0.1
0.05
0
400
600
800
1000
1200
FRACTION OF DROPS IN RECORD
SIMULATION TIME IN SECOND
FRACTION OF DROPS IN THE RECORD FOR THE CBR AND ALL FTPs

FIG. 13

T0527T0" hh569260



NORMALIZED DEPARTURE FROM EXPONENTIAL MEDIAN OF CBR AND ALL FTPs

FIG. 14

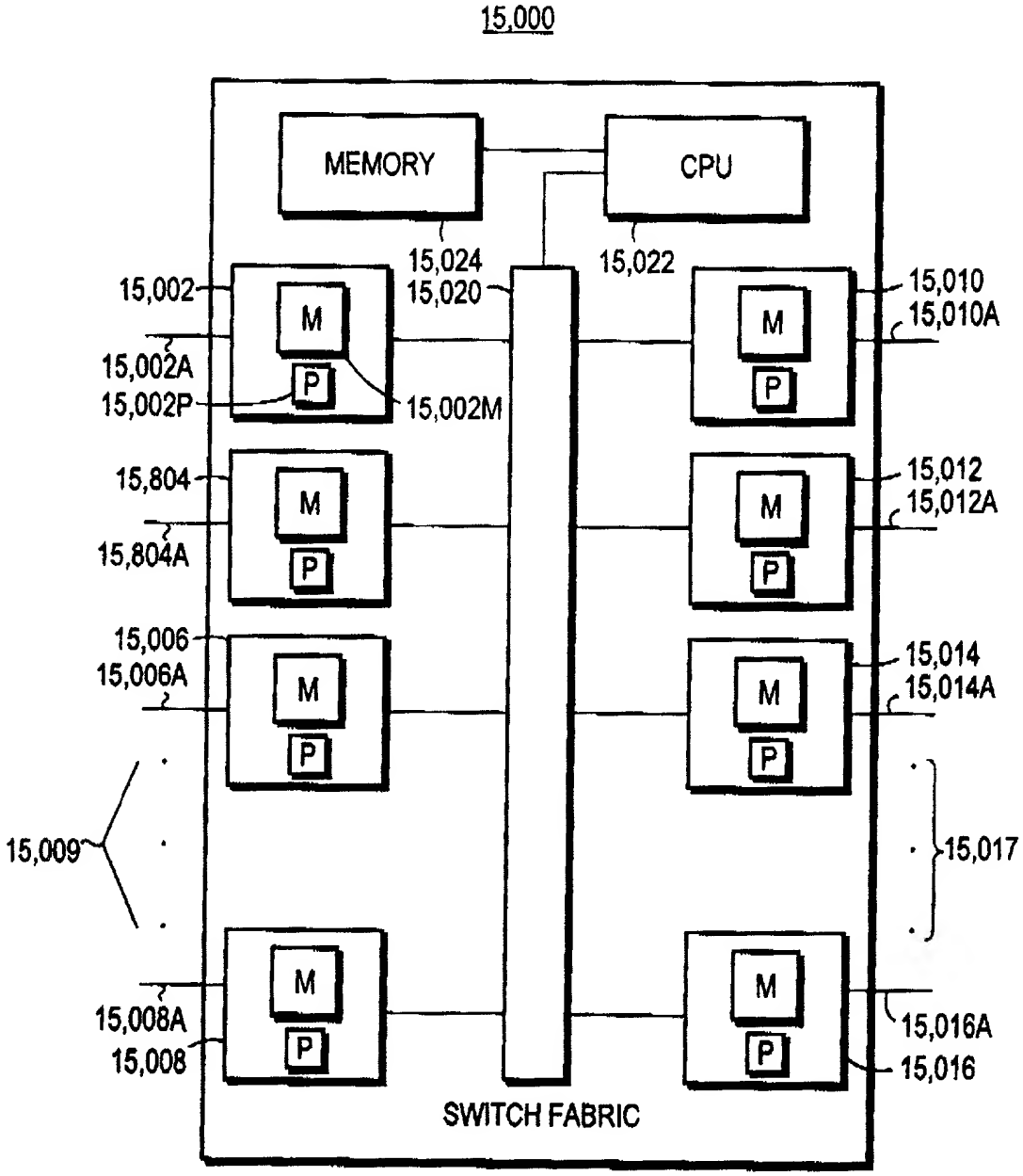

15,000
MEMORY
CPU
15,024
15,020
15,022
15,002
15,002A
15,002P
15,002M
15,010
15,010A
15,804
15,804A
15,012
15,012A
15,006
15,006A
15,014
15,014A
15,009
15,017
15,008A
15,008
15,016A
15,016
SWITCH FABRIC
M
P

FIG. 15